

WHAT IS CLAIMED IS:

1. A distal protection device comprising:

a filter cartridge having a frame portion, a filter portion, and; and

5 a proximal region having a ridge for interface with a retrieval device.

2. The device of claim 1, wherein the retrieval device comprises a balloon catheter.

3. The device of claim 1, further comprising a longitudinal portion, wherein the longitudinal portion has a proximal end, a distal end and wherein the proximal region is a proximal section of the longitudinal portion.

10 4. The device of claim 3, further comprising a lumen between the proximal end and the distal end of the longitudinal portion.

5. The device of claim 1, wherein the proximal region is a proximal section of the frame portion.

15 6. The device of claim 3, wherein the longitudinal portion has a substantially circular cross section.

7. The device of claim 3, wherein the ridge is a distally decreasing region on the outer perimeter of the proximal end of the longitudinal portion.

8. The device of claim 4, wherein the ridge is a distally increasing region on the inner perimeter of the proximal end of the longitudinal portion.

9. The device of claim 1, wherein the longitudinal portion further comprises a toroidal lumen having a proximal end and a distal end, wherein the toroidal lumen defines an inner longitudinal portion disposed within the toroidal lumen and an outer longitudinal portion disposed around the toroidal lumen, and wherein the outer longitudinal portion and the inner longitudinal portion are connected proximate the distal end of the outer longitudinal portion.

10. The device of claim 9, wherein the ridge is a distally decreasing region on the outer perimeter of the inner longitudinal portion.

11. The cartridge device of claim 9, wherein the ridge is a distally increasing region on the inner perimeter of the outer longitudinal portion.

12. The cartridge device of claim 3, wherein the longitudinal portion and the frame portion of the filter cartridge are monolithic.

13. A distal protection system comprising:

a filter cartridge having a proximal region with a ridge; and

15 a catheter having a distally located inflatable cuff, the cuff having an inflated and a deflated position, wherein when the cuff is in the inflated position at a point relative to the filter cartridge where at least a portion of the cuff is distal the ridge, at least a portion of the filter cartridge is prevented from moving distally beyond the cuff.

14. The system of claim 13, wherein the filter cartridge comprises a frame portion, a filter portion disposed on the frame portion, and a longitudinal portion having a proximal end, a distal end and a lumen disposed therebetween.

15. The system of claim 13, wherein the retrieval device is comprised of a first longitudinal member having a proximal end, a distal end and a first lumen disposed therebetween, wherein the first lumen is fluidly connected to the cuff.

16. The system of claim 13, wherein the retrieval device is further comprised of a second lumen disposed parallel to the first lumen, the second lumen having a proximal opening and a distal opening.

17. The system of claim 13, wherein the proximal region with a ridge is a proximal section of the longitudinal portion.

18. The system of claim 13, wherein the proximal region with a ridge is a proximal section of the frame portion.

19. The system of claim 14, wherein the longitudinal portion has a substantially circular cross section.

20. The system of claim 14, wherein the ridge is a distally decreasing region on outer perimeter of the proximal end of the longitudinal portion.

21. The system of claim 14, wherein the longitudinal portion further comprises a second lumen having a proximal end and a distal end, wherein the second lumen is disposed around the first lumen, defining an inner longitudinal portion disposed between the first lumen and the second lumen and an outer longitudinal portion disposed around the second lumen, and wherein the outer longitudinal portion and the inner longitudinal portion are connected proximate the distal end of the outer longitudinal portion.

22. The system of claim 21, wherein the ridge is a distally decreasing region on the outer perimeter of the inner longitudinal portion.

23. The system of claim 21, wherein the ridge is a distally increasing region on the inner perimeter of the outer longitudinal portion.

5        24. The system of claim 21, wherein the longitudinal member and the frame portion of the filter cartridge are monolithic.

25. The system of claim 21, wherein the cuff in the expanded state has a toroidal shape.

10       26. The system of claim 13, wherein the cuff comprises a plurality of expabandable balloons disposed at the distal end of the tube.

27. The system of claim 13, wherein the cuff is disposed on the outer surface of the tube.

28. The system of claim 13, wherein the cuff is disposed within the first lumen of the tube.

15       29. A method of retrieving a cartridge from a body vessel lumen, the method comprising the steps of:

providing a filter cartridge disposed within a body vessel lumen;

providing a retrieval device;

advancing the retrieval device distally in the body vessel lumen until at least a

20       portion of the retrieval device is distal the proximal most portion of the filter cartridge;

engaging the filter cartridge with the retrieval device such that at least a portion of the filter cartridge is prevented from moving distally beyond at least a distal portion of the retrieval device; and

5      advancing the retrieval device and the filter cartridge proximally from the body lumen.

30. The method of claim 29 wherein the retrieval device has a distally located inflatable cuff and the step of engaging the filter cartridge with the retrieval device includes expanding the cuff.

10      31. The method of claim 30 wherein the filter cartridge has a proximal ridge and wherein the step of advancing the retrieval device includes advancing the retrieval device until at least a portion of the inflatable cuff extends distally beyond the ridge.

32. The method of claim 31 further comprising the steps of:

providing a wire extending distally through at least a portion of the filter cartridge and proximally from the body lumen; and

15      advancing the balloon catheter proximally over the wire.

33. The method of claim 31 further comprising the steps of:

advancing a sheath to a point proximate the distal end of the filter cartridge; and  
advancing the filter cartridge proximally into the sheath.

34. The method of claim 31, wherein the step of providing a filter cartridge further comprises the steps of:

- advancing a wire distally to a filter cartridge deployment location;
- advancing a sheath distally over the wire; and
- 5     advancing a filter cartridge through the sheath using a catheter.

35. A distal protection device comprising:

- A filter cartridge having a frame portion, a filter portion; and
- A proximal region having an area with an increased coefficient of friction for interface with a retrieval device.

10     36. The device of claim 1, further comprising a radiopaque band on the proximal region.

37. The device of claim 1, further comprising a second ridge on the proximal region.

38. The system of claim 13, wherein the inflatable cuff has a first inflation chamber and a second inflation chamber located distal the first inflation chamber.

15     39. The system of claim 13, further comprising a balloon on the catheter proximal the inflatable cuff.

40. The system of claim 39, wherein the balloon is an angioplasty balloon.

41. The system of claim 13, further comprising a radiopaque band proximate the inflatable cuff.

20     42. The system of claim 13, wherein the inflatable cuff has a surface with an increased coefficient of friction.